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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/018,179	05/03/2002	Thomas Skotnicki	5310-03900	8545

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EXAMINER

PHAM, HOAI V

ART UNIT PAPER NUMBER

2814

DATE MAILED: 02/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/018,179

Applicant(s)

SKOTNICKI ET AL.

Examiner

Hoai V Pham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 May 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9, 10, 12-16 and 23-28 is/are rejected.
- 7) ☒ Claim(s) 11 and 17-20 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 21-22 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

“the set of conditions comprises an implantation angle of incidence with respect to the normal angle to the substrate, an implantation dose, and an implantation energy” is not described in the specification and shown in the figures.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 9,10, 12-16, 23-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Hshieh et al. [5,731,611].

With respect to claim 9, Hshieh (figs. 6A-6D, cols. 5-6) discloses a semiconductor device, comprising:

a semiconductor substrate (210) having a predetermined concentration, N_s , of a dopant of a first conductivity type;

a source region (265) and a drain region (265) doped with a dopant of a second conductivity type;

junctions, wherein the junctions delimit a channel region of a predetermined length, L_N in the substrate, wherein the junctions are defined by the source region and the drain region;

first pockets (250) located adjacent to each of the junctions, wherein the pockets have a predetermined length, L_p , wherein the first pockets are doped with a dopant of the first conductivity type with a dopant concentration, N_p , which locally increases a net concentration in the substrate above N_s ;

second pockets (230) located adjacent to each of the junctions and stacked against each of the first pockets, wherein the second pockets have a length, L_n , such that L_n is greater than L_p , and wherein the second pockets are doped with a dopant of the second conductivity type with a dopant concentration, N_n , such that N_n is less than N_p , which locally decreases a net concentration without changing a conductivity type, and wherein N_n is less than N_s ; and

wherein an overall length of the first pockets and the second pockets is less than the length, L_N , of the channel region (fig. 6D).

With respect to claims 10, 12, Hshieh discloses that the second pockets (230) comprise a plurality of elementary pockets stacked against each other (fig. 6D). Notice: as interpreting the claim in a broad scope, the second pockets (230) are considered as a plurality of elementary pockets stacked against each other since the claim does not claim the different conductivity of the plurality of elementary pockets.

With respect to claim 13, Hshieh discloses that the semiconductor device comprises an MOS transistor (col. 5, lines 28-30).

With respect to claim 14, Hshieh discloses that the first conductivity type comprises P-type conductivity (fig 6D).

With respect to claim 15, Hshieh discloses that the second conductivity type comprises n-type conductivity (fig 6D).

With respect to claim 16, Hshieh (figs. 6A-6D, cols. 5-6) discloses a method for fabricating a semiconductor device, comprising:

forming a semiconductor substrate (210) with a predetermined concentration, N_s , of a dopant of a first conductivity type;

forming a source region (265) and a drain region (265) by doping the source and drain regions with a dopant of a second conductivity type, wherein the second conductivity type is opposite the first conductivity type, wherein the source and drain regions form junctions that delimit a channel region between them, and wherein the channel region comprises a predetermined length, L_N ;

forming first pockets (250) adjacent to each of the junctions in the channel region, wherein first pockets are formed by doping each of the first pockets with a

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predetermined concentration, N_p , of a dopant of the first conductivity type, which locally increases a net concentration in the substrate above N_s , and wherein each of the first pockets comprises a predetermined length, L_p ; and

implanting in the channel region a dopant of the second conductivity type under a set of conditions such that second pockets (230) are formed in the channel region, wherein the second pockets are stacked against each of the first pockets, wherein the second pockets have a length, L_n , such that L_n is greater than L_p , wherein the second pockets have a concentration, N_n , of the dopant of the second conductivity type such that N_n is less than N_p , which locally decreases a net concentration without changing a conductivity type, wherein N_n is less than N_s , and wherein the overall length of the first pockets and the second pockets is less than the nominal length, L_N , of the channel region.

With respect to claims 17, Hshieh discloses that the second pockets (230) comprise a plurality of elementary pockets stacked against each other (fig. 6D). Notice: as interpreting the claim in a broad scope, the second pockets (230) are considered as a plurality of elementary pockets stacked against each other since the claim does not claim the different conductivity of the plurality of elementary pockets.

With respect to claims 23, Hshieh discloses that the set of conditions comprises an implantation dose (col. 5, lines 51-54).

With respect to claims 24, Hshieh discloses that set of conditions comprises an implantation energy (col. 5, lines 51-54).

With respect to claim 25, Hshieh discloses forming an MOS transistor with the semiconductor device comprises (col. 5, lines 28-30).

With respect to claim 26, Hshieh discloses that the first conductivity type comprises P-type conductivity (fig 6D).

With respect to claim 27, Hshieh discloses that the second conductivity type comprises n-type conductivity (fig 6D).

With respect to claim 28, Hshieh (figs. 6A-6D, cols. 5-6) discloses a semiconductor device, comprising:

- a semiconductor substrate (210) having a concentration, N_s , of a dopant of a first conductivity type;

- a source region (265) and a drain region (265) doped with a dopant of a second conductivity type;

- junctions that define a channel region of a length, L_N , in the substrate, wherein the junctions are defined by the source region and the drain region;

- first pockets (250) located adjacent to each of the junctions, wherein the first pockets have a length, L_p , and wherein the first pockets are doped with a dopant of the first conductivity type with a dopant concentration, N_p ;

- second pockets (230) stacked against each of the first pockets, wherein the second pockets have a length, L_n , such that L_n is greater than L_p , wherein the second pockets are doped with a dopant of the second conductivity type with a dopant concentration, N_n , such that N_n is less than N_p ; and

wherein an overall length of the first pockets and the second pockets is less than the length, L_N , of the channel region (fig. 6D).

Allowable Subject Matter

5. Claims 11,17-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter: the prior art of record fails to disclose the second pockets comprise a plurality of elementary pockets stacked against each other, wherein each elementary pocket comprises a rank, i , and a predetermined length, L_{ni} , wherein a predetermined concentration, N_{ni} , of a dopant of the second conductivity type satisfies the relationships:

$$L_{n1} > L_P$$

$$L_{ni-1} < L_{ni} < L_{ni+1};$$

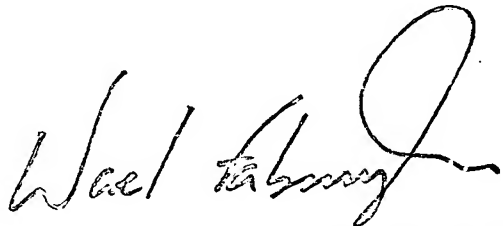
$$N_{ni-1} > N_{ni} > N_{ni+1}; \text{ and}$$

wherein the sum, $\sum N_{ni}$, of the concentrations of the dopant in the elementary pockets satisfies the relationship, $\sum N_{ni} < N_s$.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoai V Pham whose telephone number is 703-308-6173. The examiner can normally be reached on 6:30A.M. - 6:00P.M..
8. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.
9. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

HP
Hoai Pham
February 6, 2003


SUPERVISORY PRIMARY EXAMINER
TECHNOLOGY CENTER 2800